Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
International Bureau Seeks Comment on	)	IB Docket No. 16-185
Recommendations Approved by World	)	
Radiocommunication Conference	)	
Advisory Committee	)	

COMMENTS OF FACEBOOK, INC.

October 17, 2018

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I. INTRODUCTION AND SUMMARY

Facebook, Inc. ("Facebook") is pleased to submit these comments in response to the Public Notice of the Federal Communications Commission's International Bureau seeking feedback on the World Radiocommunication Conference Advisory Committee's ("WAC") recommended proposals for the United States to contribute to the upcoming Organization for American States' Committee on Telecommunications subcommittee (CITEL PCC.II) as our Region prepares for the World Radiocommunication Conference 2019 (WRC-19).[1]

Facebook's mission is to give people the power to build community and bring the world closer together. And connecting people is a critical first step in executing this mission. Today, nearly four billion people are still not connected to Internet. Among those that have broadband connectivity, many are under-connected. Connecting these people is a complicated effort that requires not just bringing network infrastructure to more people, but establishing a regulatory environment that fosters innovation and encourages investment.

To do its part, Facebook, working with a range of partners, has launched several initiatives focused on connecting the unconnected and under-connected. It will take a mix of technical solutions to bring connectivity to all. As such, Facebook has supported research and development efforts in a range of technologies, including terrestrial, mobile, satellite, and high altitude platform stations ("HAPS"). Facebook has invested in HAPS R&D to prime the ecosystem for this promising tool for broadband connectivity. High-altitude platforms could provide more affordable, fast and flexible backhaul of broadband services, and could further become a key link to emergency communications in the wake of natural disasters. To accelerate

[1] *International Bureau Seeks Comment on Recommendations Approved by World Radiocommunication Conference Advisory Committee*, Public Notice, DA 18-1017, IB Docket No. 16-185 (rel. Oct. 3, 2018) ("*WAC Public Notice*").

commercial viability of HAPS, Facebook has initiated development of a broadband communications system to be used for HAPS supporting a range of HAPS partners.

The outcome of the WRC-19 Agenda Items will affect these efforts. Improving connectivity around the world means pursuing spectrum policy that maximizes the utilization of this limited resource and promotes the expansion of both the capacity and coverage of wireless networks. To further these goals, Facebook provides the following comments addressing the U.S. position on Agenda Item 1.14 regarding HAPS, as well as the U.S. position on Agenda Item 1.13 regarding the 66-71 GHz band, and Agenda Item 1.16 regarding radio local area networks (RLANS, essentially Wi-Fi) in the 5150-5250 MHz band.

With respect to Agenda Item 1.14, Facebook has worked to develop and support View A of WAC Document 065 ("WAC/065"). While there are multiple views, Facebook is pleased that the four Views from the private sector support HAPS identifications in a number of bands. The following bands have support from at least two different WAC participants: 21.5 – 22 GHz, 24.25 – 27.5 GHz, 28/31 GHz, 38 – 39.5 GHz, and 47 GHz. Accordingly, Facebook recommends the Commission champion such a proposal in reconciliation with the National Telecommunication and Information Administration ("NTIA") as detailed in Section II below.

Additionally, under Agenda Item 1.13, Facebook supports the WAC's Recommendation in Document WAC/064 for No Change to the 66-71 GHz band. The 66-71 GHz band is poised to extend the innovation, development, and deployment of 5G services already occurring in the adjacent 57-66 GHz band. The imposition of an IMT identification in the 66-71 GHz band could lead to regulatory uncertainty, freeze commercial investment, and hinder international harmonization, as a number of administrations have already made or planned to make the band unlicensed.

Lastly, Facebook urges the Commission to adopt WAC/066-View A for Agenda Item 1.16, which appropriately reaffirms the U.S. position at International Telecommunication Union Radiocommunication Sector (ITU-R) Working Party 5A regarding co-existence of RLANs in the UNII-1 band (5150-5250 MHz) with other services and aligns ITU Radio Regulations with the U.S. rules governing RLAN operations in the band.

II. THERE IS BROAD SUPPORT FOR IDENTIFICATION OF SPECTRUM FOR HAPS ACROSS THE VIEWS

The U.S. has long been a leader in innovation. Advances in avionics, solar energy components, and lightweight composite aircraft parts have fueled global interest in high-altitude unmanned vehicles for a range of applications, including delivery of broadband. The U.S. has also long recognized the importance of broadband for economic growth. To be a leader in our ITU Region and globally, the U.S. must also recognize the importance of broadband for our partners. At the last CITEL PCC.II meeting, a Draft Inter-American Proposal ("DIAP") was adopted by Brazil, the Bahamas, and Ecuador that recognized the role HAPS can play in extending broadband networks at a more affordable cost point in underserved areas.[2] Facebook and HAPS proponents believe that HAPS broadband backhaul is a supplemental service to mobile and satellite and not in direct competition to either of those services.

Facebook has invested substantial resources in proving HAPS technology to connect those who continue to live without the benefit of broadband internet connectivity. While Facebook never intended to commercially manufacture or operate HAPS, Facebook wishes to see this promising technology be supported and adopted by mobile and satellite operators alike.

[2] Inter-American Telecommunication Commission [CITEL], *Draft Inter-American Proposals For WRC-19 Agenda Item 1.14*, at 3-10, CCP.II-RADIO-31/doc.4358-1-14/18 (Jul. 19, 2018) ("DIAP").

For this reason, Facebook is pleased that the mobile community supports identifications in a number of bands, including those supported by our Region 2 neighbors in the CITEL DIAP, subject to the ITU-R expert working party's pfd mask being met. Likewise, the satellite community stated in its Cover to View D that:

> The protection of GSO FSS satellite networks/non-GSO FSS satellite systems on a co-frequency/co-coverage basis may be feasible if the frequency bands used by a HAPS network is transmitting in an opposite direction from that of the FSS satellite network (i.e., satellite Earth-to-space with HAPS-to-ground, and satellite space-to-Earth with ground-to-HAPS). In these cases, some studies conducted for FSS bands other than those identified today for HAPS in the fixed service in the 6 GHz range suggest that satellite stations can be protected from HAPS-to-ground emissions, while relatively short separation distances can be used to protect Earth stations from ground-to-HAPS emissions.[3]

The four Views from the private sector demonstrate support for HAPS identifications, with specified transmission directionality and agreed pfd limits to protect their own services, from multiple proponents for the following bands: 21.5 – 22 GHz[4], 24.25 – 27.5 GHz, 28/31 GHz, 38 – 39.5 GHz and 47 GHz. Accordingly, Facebook recommends that the Commission champion such a proposal in reconciliation with NTIA, with co-primary status accorded to HAPS links.[5] Co-primary status for HAPS links is crucial to encourage U.S. investment in this

[3] *See WAC Public Notice*, Attachment A View D, at 1 (WAC/065).

[4] Facebook supports a compromise identification of 21.5 -22 GHz (rather than the full 21.4-22 GHz proposed by WRC-15 for study in Region 2), as recommended by Lockheed Martin in View C, in order to protect a federal aeronautical mobile system in the lower 21 GHz band. This range is narrower than the full study band of 21.4-22 GHz that Mexico has proposed for a HAPS identification at CITEL. *See* Inter-American Telecommunications Commission (CITEL), Preliminary Proposals for WRC-19 Agenda Item 1.14, Document at 3, CCP.II-Radio-31/doc.4357-1-14/18 (Jul. 18, 2018). The U.S. can nonetheless maintain leadership as an innovator in the field of UAS for broadband at CITEL by combining the 26 GHz, 28/31 GHz and 38 GHz bands, with the slightly more narrow identification of HAPS at 21.5-22 GHz, on a co-primary basis.

[5] NTIA's proposal in WAC/074 for No Change (NoC, meaning no new HAPS identification in the range) in 24.25-27.0 GHz does not appear to take into account the restrictions in directionality that Facebook made to protect incumbent federal systems, as well as

emerging field. In the twenty-first century, the U.S. should lead in all aspects of unmanned aircraft system (UAS) innovation, including for broadband to underserved communities.

The U.S. was the lead sponsor of HAPS at WRC-15, identifying broadband HAPS as a priority at the last Conference. The Agenda Item passed due to developing country support that the U.S. encouraged, both in our Region and in Africa. The WRC-15 Conference invited the ITU-R to study the feasibility of modifying the existing designations and possibly making new designations in other bands to facilitate the delivery of backhaul for today's broadband over HAPS. As part of this Agenda Item, the ITU-R has accepted studies indicating that approximately four gigahertz would be required to support broadband delivery via HAPS.[6]

Facebook has sought identifications in bands where mobile operators plan to deploy IMT 2020 in order to deliver more affordable backhaul connectivity to consumers in underserved communities driven by the economies of scale in broadband equipment that can be used both in 5G and HAPS, such as chips, antennas, and other components.

Facebook's acceptance of protection criteria, generous guard bands, and application of out-of-band emissions to further protect these systems. National Telecomm. Information Administration, *NTIA Draft Proposals,* at 40-45, WAC/074 (Sept. 21, 2018). Federal users offered no sharing studies that suggest any federal systems must be protected in the 24.25-25.25 GHz band, most of which they agreed could be identified for flexible commercial broadband use during deliberations in the Commission's *Spectrum Frontiers* proceeding. *See Use of Spectrum Bands Above 24 GHz for Mobile Radio Services et. al.,* Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd. 8014, at e.g., ¶ 385 *et seq*. (2016) ("2016 *Spectrum Frontiers Report and Order*"), and *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services et. al.*, Second Report and Order, 32 FCC Rcd. 10988 e.g., at ¶ 15 (2017). Moreover, NTIA's proposal was silent on the 27 – 27.5 GHz range, so View A includes this band as well.

[6] *See* International Telecommunications Union (ITU), *Draft CPM Report*, at 37, Chapter 1 Section 1/1.14/3, Doc. CPM19-2/1-E (Sept. 17, 2018), available at https://www.itu.int/en/ITU-R/study-groups/rcpm/Pages/cpm-19.aspx.

In the last three years since studies began under AI 1.14, global interest in HAPS has increased dramatically.[7] Major national operators are considering HAPS projects, as have many aerospace companies.[8] For the U.S. to lead internationally in UAS deployment for broadband, it must have a forward-leaning proposal to CITEL that builds on what our neighbors have already proposed, supporting co-primary identifications in a number of bands to encourage investment.

a. View A – Facebook, Loon

View A reflected months of meetings with various members of the WAC, across multiple industry segments, and many corresponding revisions for a U.S. proposal to CITEL to accommodate concerns of federal systems, mobile and satellite service operators, equipment vendors, and other high-altitude platform developers. View A was also informed by the substantial efforts HAPS proponents have undertaken over the last three years to develop sharing studies for the expert ITU-R working party, including with federal systems in the candidate bands. Studies to support these operations are currently under review within the ITU-R WP 5C

[7] *See, e.g.*, Sam Davis, *Prototype Solar-Powered, High-Altitude UAV Undergoing Flight Tests*, Machine Design, (Jul. 24, 2018), https://www.machinedesign.com/motion-control/prototype-solar-powered-high-altitude-uav-undergoing-flight-tests; *Alta Devices Joins Elite high Altitude Leadership Group*, Alta Devices (Jul. 14, 2017), https://www.altadevices.com/alta-devices-joins-elite-high-altitude-leadership-group/ ("Alta Joins Leadership Group"); *Zephyr: Pioneering the Atmosphere*, Airbus, https://www.airbus.com/defence/uav/zephyr.html. *AeroVironment Announces Joint Venture and Solar High-Altitude Long-Endurance Unmanned Aircraft System Development Program*, AeroVironment (Jan. 8, 2018), http://www.avinc.com/resources/press-releases/view/solar-high-altitude-long-endurance-uas.

[8] *See* KT Corp., *KT Unveils 5G Emergency Rescue Platform 'SKYSHIP'*, Cision (Jul. 5, 2018, 4:52 PM), https://www.prnewswire.com/news-releases/kt-unveils-5g-emergency-rescue-platform-skyship-300676490.html ("KT News Release"); *Stratobus Project Takes Off!*, Thales (Apr. 26, 2016), https://www.thalesgroup.com/en/worldwide/space/press-release/stratobus-project-takes, and *Hispasat and Thales Alenia Space Team Up on Stratospheric Balloon Demonstration for 4G/5G Telecom Applications*, Thales Alenia (Sept. 11, 2018),https://www.thalesgroup.com/en/worldwide/space/press-release/hispasat-and-thales-alenia-space-team-stratospheric-balloon.

process, including further revisions drafted by Facebook currently pending in the U.S. National Committee process for WP 5C that include additional protections to the satellite and mobile industries.[9] Numerous protections were proposed by both federal and commercial incumbents, negotiated and accepted by Facebook, and included in pending U.S. contributions to the ITU-R.

View A offers protections for all of the existing services including fixed service, mobile service, fixed satellite service, Earth Exploration Services ("EESS"), EESS/Space Research Services (Passive), Radio Astronomy Services and Inter-Satellite Services. View A proposes to protect the existing services by incorporating thresholds that all HAPS platforms must meet, either pfd levels or EIRP density levels as appropriate, to protect other services. View A details how the other services can be protected, and in several instances proposes that transmissions to and from HAPS platforms would operate in opposing directions to incumbents to promote compatibility with these other services. For example, where possible, View A supports HAPS uplink operations (from a ground station to the HAPS platform approximately 20 kilometers in the stratosphere, in a station-keeping position) where there is an FSS downlink in order to minimize the risk of harmful interference to other services.

In the interest of enabling the U.S. to continue to lead on UAS technology for broadband, Facebook supports the Commission making an informed decision that incorporates components from the various Views. Facebook comments below on the other Views.

[9] Facebook has proposed revisions to the sharing and co-existence studies to take into account guidance from the relevant satellite expert group, pursuant to *International Telecomm. Union Working [ITU] Party 4A,* Reply Liaison Statement to Working Party TG5/1*, Doc. 5C/546-E* (Jul. 23, 2018).

b. View B – Mobile Operators and Vendors

1. Harmful Interference and PFD Limits

In the draft 27.9 – 28.2 GHz Resolution, the proposal within View B replaces "harmful interference" with "unacceptable interference." This proposed change introduces new terminology and leaves undefined what is considered "unacceptable." The term "harmful interference" has long been used in U.S. regulation, as well as by other Members of the ITU and has an established meaning.[10] The proposal in View B to use "unacceptable interference" at 28 GHz would raise doubt as to its meaning, and applicable enforcement mechanisms, since it could include a level of interference that does not degrade or obstruct the mobile service. Accordingly, Facebook requests that the Commission support a U.S. Proposal that includes protection against "harmful interference" in all bands, including in 28 GHz, which is both consistent with U.S. regulatory policy and a term that is more meaningful to an international audience.

Consistent with the Commission's long-standing policy to protect against only harmful interference, Facebook's View A recommends a pfd mask to protect mobile services against harmful interference, such as repeated, interrupting interference, and not a guarantee against any noise in the band, 100% of the time. There are three main concerns with the protection proposed by the mobile community in View B. The first concern is that the proposals in View B remove the percentage of time or deployment for which a HAPS operator would have to demonstrate compliance. This makes it more difficult for operators of HAPS to demonstrate their ability to meet the protection criteria. It is not practical to require that the pfd mask be met 100% of the

[10] "*Harmful Interference.* Interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with [the ITU] Radio Regulations." 47 CFR §2.1.

time, as opposed to a more realistic threshold. Such a definition would be contrary to Commission principles of spectrum sharing. By comparison, the satellite community at the ITU has proposed criteria that have both long-term and short-term protections defined.[11]

Second, for those bands where mobile proponents agree that an identification can be made and that a pfd mask would be an appropriate means for protecting base stations and user equipment, they do not support the inclusion of any sort of attenuation losses, either in the formula for calculating the pfd or in a compliance mask. In addition the requirement 'under clear sky conditions' from the pfd masks for protecting fixed and mobile services has been excluded from the text. By not offering a means for accommodating the attenuation losses, the proposals contained in View B do not provide the needed flexibility for proponents of HAPS to demonstrate the ability of HAPS operators to meet the proposed protection levels in a realistic scenario.

Third, as raised by the satellite community in their Cover to View D, relative to the 28 GHz band, which is also the subject of Agenda Item 1.5 on Earth Stations in Motion, there should be consistency with the protection the U.S. proposes to protect mobile services at 28 GHz from newly identified applications like ESIMs or HAPS. As the signatories to View D explain, the pfd mask included in View A is:

> "clearly intended to protect the mobile service from HAPS-to-ground emissions in the 27.9-28.2 GHz band. There is no agreement from the proponents of View D, however, that the levels in this pfd mask are necessary to protect the co-frequency mobile service, or on whether higher pfd levels could be produced at some elevation angles without causing unacceptable interference to mobile stations and links. Indeed, a different pfd mask from [sic] protection of mobile service stations and links across the entire 27.5-29.5 GHz band from aeronautical earth stations in motion (aeronautical ESIM) is proposed for in View A to the proposal for WRC-19 Agenda item 1.5 (*see* Document IWG-3/051r3).

[11] International Telecomm. Union (ITU) Working Party 4A, *Reply Statement to Task Group 5/1*, at 2, Doc. 5-1/411-E (Jul. 23, 2018).

> Thus, the authors of View D are of the opinion that the mask in *resolves 2* of Draft New Resolution [E114] in Proposal No. USA/1.14/20 from View A overprotects the mobile service, and that higher pfd levels than those in the View A mask may be able to be produced by aeronautical ESIM and still protect the mobile service from unacceptable interference."[12]

Facebook urges the Commission to think carefully about the above, particularly in light of ITU precedent. It is important that a strong U.S. proposal moves forward to CITEL, one that meets the needs of all U.S. stakeholders, while demonstrating U.S. leadership in emerging broadband technology.

2. HAPS Spectrum Needs

The Cover Note to View B suggests that the existing HAPS identifications have sufficient spectrum for broadband HAPS.[13] This is not the case. There is only one global HAPS identification today, in the V Band, for 300 MHz at 47.2-47.5 GHz paired with 300 MHz at 47.9-48.2 GHz.[14] The other two existing HAPS identifications in the C Band (2 x 80 MHz) and Ka Band (2 x 300 MHz) are in five countries and less than two-dozen countries, respectively. Those two regional identifications are outside of Region 2, and have no overlapping countries between them.[15] Thus, as of today, the only accessible spectrum for HAPS operators in the Americas is the 600 MHz in the 47 GHz band identification. The Commission is considering a U.S. proposal for CITEL, Region 2. It is misleading to suggest that there is sufficient spectrum to offer broadband HAPS in our Region through today's existing HAPS identifications. The Cover Note

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[12] *See WAC Public Notice,* Attachment A at 86, Cover Note to View D, WAC/065.

[13] View B provides: "With regard to the amount of spectrum, we note that the existing allocations provide nearly double the minimum amount of spectrum needed according to ITU-R studies on the matter: the minimum amount is 720 MHz and the existing footnotes for HAPs total 1360 MHz." *WAC Public Notice* Attachment A at 58, Cover Note to View B (WAC/065).

[14] *See* Int'l Telecomm. Union (ITU), Radio Reg. 5.552A (ed. 2016) ("ITU R.R.").

[15] ITU R.R.ITU RR 5.457, 5.537A and 5.543A.

of View B also mistakenly states that the ITU-R found that the minimum amount of spectrum needed for HAPS is 720 MHz. 720 MHz of spectrum was the minimum aggregate bandwidth needed for HAPS providing certain disaster recovery applications, and for a single specific connectivity system – not for the majority of the broadband connectivity systems being studied at the ITU. For the broadband HAPS connectivity system that Facebook has researched and tested, we have found that 4 gigahertz is needed for both the gateway and user links.[16]

3. HAPS System Characteristics

View B also notes that over the last three years, more and more HAPS systems were brought by various countries to the ITU-R for study.[17] While that has certainly made for more work, it is a reflection of the growing interest around the globe in HAPS, ignited by U.S. leadership on this innovative technology at the last World Radio Conference. Nonetheless, the vast bulk of the studies before the ITU-R have been of the HAPS system researched by Facebook, which proposes 4 CPEs per beam and not the system with 189 CPEs per beam which View B references. While View B implies this other system has high number of CPEs, View B does not explain that per the ITU-R HAPS Characteristics study, that higher CPE system would only have 2.6% of the CPEs active per beam at any one time – meaning only 4 CPEs active at any one time per beam.[18] In any event, through Facebook's endeavors, other HAPS proponents

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[16] *Supra* n.6.

[17] *WAC Public Notice,* Attachment A at 58, Cover Note to View B (WAC/065).

[18] *See* Int'l Telecomm. Union [ITU] Radiocommunications Study Groups, *Annex 14 to Working Party 5C Chairman's Report: Preliminary Draft New Recommendations/Report ITU-R F.[BROADBAND HAPS CHARACTERISTICS]*, at 7 § 4, Table 2 n. ***, Annex 14 to Doc. 5C/531-E (Jun. 5, 2018) (providing "189 users/beam is the maximum number of CPEs per beam. Around 2.6% is the percentage of simultaneous active transmitting users per beam.")

rallied around a single pfd and EIRP being met by a HAPS system, regardless of the number of CPEs per beam. Under this system-agnostic approach to protecting allocated services, mobile's protection criteria could be met regardless of the number of CPEs per beam.

c. View C – Lockheed Martin

Submitted by Lockheed Martin, View C proposes to identify the 21.5 – 22 GHz band as an uplink for HAPS and to identify portions of the 25.25 – 27.5 GHz band as a downlink. Facebook supports the use of these bands by HAPS operators, but proposes the opposite transmission directionality, in order to protect federal incumbents as they requested. As stated above, Facebook will also support a U.S. proposal that begins at 21.5-22 GHz band. Facebook notes that relative to protection of mobile, View C includes consideration of attenuation as part of the compliance, akin to View A. As mentioned in the discussion on View B, it is important that the Commission consider carefully the appropriate protection criteria, including whether to take into account the attenuation either by adding the losses to the compliance mask or including it in the pfd formula.

d. View D – Satellite Community

Members of the satellite community offered proposals within View D that support downlink operations in the 21.4-22 GHz as contained in View A. The proposals within View D support a proposal to make a primary Fixed allocation in Region 2 for the 24.25 – 24.75 GHz band with a corresponding HAPS identification in that band, as do the proposals in View A.

For those bands where there are Fixed Satellite operations, the satellite community proposes No Change in the bands, specifically the 24.75 – 25.25 GHz band, the 27.9 -28.2 GHz band; the 38 – 39.5 GHz band and the 47/48 GHz bands. Where there are existing

identifications, View D's rationale for No Change is that studies have not yet warranted changes to the existing identifications. However, in the case of the 31 GHz band, which today has an identification only about two dozen countries in Region 1 and 3, View D proposes modification to allow a worldwide downlink allocation.

To address the concerns of the satellite community, View A proponents agreed HAPS links should be operated in the opposite direction from the satellite services' transmissions. Such directionality mitigation will prevent risks of harmful interference, thereby meeting the fixed satellite protection criteria. As an example, View A proposes HAPS operations from the high-altitude platforms in the downlink direction in the 24.75 - 25.25 GHz and 27 – 27.5 GHz bands where the Fixed Satellite Service operates in the Earth-to-space direction.[19] Other examples exist throughout View A whereby the direction of HAPS operations has been selected in order to protect neighboring active and passive satellite services.

Separately as an effort to seek agreement with the satellite community, View A proponents also indicated in View A that it would not allow HAPS ground stations to claim protection from Fixed Satellite Service earth stations transmitting in the bands 24.75-25.25 GHz and 27.0-27.5 GHz in neighboring administrations, and that ITU Radio Regulation No. 5.43A shall not apply.[20] This condition, requested by the satellite community and agreed to by View A proponents, was captured in other bands as well.

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[19] *See* 47 C.F.R. § 2.106.

[20] Int'l Telecomm. Union (ITU), Radio Reg. 5.43A - 1*bis*) (ed. 2016) ("Where it is indicated in these Regulations that a service or stations in a service may operate in a specific frequency band subject to not claiming protection from another service or from another station in the same service, this means also that the service which is subject to not claiming protection shall not cause harmful interference to the other service or other station in the same service. (WRC-2000)").

Finally, in light of View D's proposal for No Change to the existing global HAPS modification in the 47.2-47.5 GHz band, paired with 47.9-48.2 GHz band, Facebook agrees with the satellite community that the U.S Proposal to CITEL should be No Change to that identification. Facebook had been willing through its View A to specify the directionality of the band and limit it to gateway use only, but since this is currently the only existing global HAPS identification, such limitations are not timely. Accordingly, Facebook agrees with View D's proposal for No Change to the 47 GHz HAPS identification.

e. In Conclusion, in the Spirit of Cooperation, Facebook Supports a Compromise Position

Facebook appreciates the extensive efforts of those within the mobile, high-altitude and satellite industries and the U.S. government to consider designating sufficient spectrum to support delivery of broadband services via HAPS. It is in this spirit of cooperation and desire to identify sufficient spectrum to support broadband HAPS that Facebook comments on the Views on HAPS. Facebook supports Lockheed Martin's identification in the 21 GHz to begin at 21.5 GHz, to protect the federal AMS system in the band. Facebook agrees with the satellite community's View D on a No Change proposal to CITEL for the existing global identification for HAPS at 47 GHz. Facebook supports the Commission's careful consideration of the mobile community's pfd mask, towards the end of supporting a U.S. proposal that builds on the Draft Inter-American Proposal before CITEL, while demonstrating U.S. leadership on innovative UAS technology for broadband. Any proposal that the Commission champions in reconciliation with NTIA should include co-primary status for HAPS links in all bands, in order to encourage U.S. investment leadership in this promising technology.

III. FACEBOOK ALSO SUPPORTS THE NO CHANGE PROPOSAL FOR 66-71 GHZ BAND UNDER AGENDA ITEM 1.13

Facebook supports the WAC's Recommendation for a No Change proposal for the 66-71 GHz band, under Agenda Item 1.13, in WAC/064. Under that Agenda Item, the ITU-R has been studying whether a range of bands, including 66-71 GHz, could be identified for International Mobile Telecommunications ("IMT") 2020.

A number of countries have made the adjacent 57-66 GHz (or "60 GHz band") unlicensed.[21] As a result, the 60 GHz band has attracted considerable investment resulting in innovation, development, and deployment of 5G services ranging from outdoor wireless links that extend the reach of fiber networks to personal networking technologies based on the WiGig standards 802.11ad and 802.11ay that deliver multi-Gigabit speeds between devices. 3GPP with broad industry participation are also moving forward with development for 5G NR for 60 GHz unlicensed.[22] This is occurring without an IMT identification in place. The huge demand for network capacity, higher speeds, and lower latencies is driving investment in 60 GHz unlicensed technologies for wireless distribution networks, high definition interactive video, and other uses. These services and applications are integral to 5G technologies and objectives as they support high throughput, low latency, short range communications. Facebook's Terragraph project is one example of how this band is being adopted more broadly. Last year, Facebook announced

[21] Countries around the world have adopted a license-exempt approach in the 60 GHz band, including the United States, Canada, Switzerland, Belgium, Poland, Slovakia, Brazil, Mexico, Australia, New Zealand, China, Japan, Korea, and Philippines. *See* Mario Giovanni Luigi Frecassetti, ETSI White Paper No. 9, E-Band and V-Band: Survey on status of worldwide regulation. Appendix A, Database (updated Feb. 2018) *at* https://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp9_e_band_and_v_band_survey_20150629.pdf.

[22] *See*, Qualcomm Technologies, Inc., What can we do with 5G NR Spectrum Sharing that isn't possible today? (Dec. 13 2017) *at* https://www.qualcomm.com/media/documents/files/new-3gpp-effort-on-nr-in-unlicensed-spectrum-expands-5g-to-new-areas.pdf

its Terragraph project, a low-cost high-throughput (multi-Gigabit) multi-node mesh wireless network for dense urban topologies that could provide fiber-like reliability for access at a lower upfront cost.[23]

The 66-71 GHz band is expected to become a natural extension of the developments in the 60 GHz license-exempt band. As the Commission recognized when it decided to extend the unlicensed framework in Part 15 to 64-71 GHz in its Spectrum Frontiers proceeding, this band, like the adjacent 60 GHz band, has promise for other non-IMT 5G technologies, like Multi-Gigabit Wi-Fi ("Wi-Gig").[24] Furthermore, CEPT is now investigating whether an unlicensed framework should be extended for the whole frequency range 57-71 GHz.[25] In fact, existing and evolving standards for both 3GPP and IEEE802.11 rely on an extension of unlicensed access into the band to expand these developing technologies.[26] Facebook agrees with the WAC's statement that the "IMT identification in the 66-71 GHz band would be counterproductive to achieving international harmonization as many administrations confirmed plans for implementation of license-exempt, non-IMT, 5G technologies such as Multiple Gigabit Wireless

[23] Terragraph: Solving the Urban Bandwidth Challenge (2018) *at* https://terragraph.com/#terragraph.

[24] 2016 *Spectrum Frontiers Report and Order* ¶ 125 (2016).

[25] *See* Electronic Communication Committee [CEPT] DRAFT CEPT Report 70 In response to the EC Permanent Mandate on the "Annual update of the technical annex of the Commission Decision on the technical harmonisation of radio spectrum for use by short range devices," *available at* https://www.cept.org/Documents/srdmg/45925/temp5rev2_draft-cept-report-70-for-submission-to-fm-after-eco-editorial-amendment.

[26] *See* Study on new radio access technology; 60 GHz unlicensed spectrum, TR 38.805, https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3154; *See* also Qualcomm, 3GPP 5GNR, Unlicensed, https://www.qualcomm.com/media/documents/files/new-3gpp-effort-on-nr-in-unlicensed-spectrum-expands-5g-to-new-areas.pdf. And, the latest IEEE 802.11-2016 standard defines six 2160 MHz channels including three that require access to spectrum in the 64-71 GHz band. Table E-1, US Operating Class 34, and/or Table E-4, Global Operating Class 180.

Systems (MGWS)."[27] Indeed, if an IMT identification in the 66-71 GHz band were established, it could lead to regulatory uncertainty and freeze commercial investment because such an identification raises the potential for exclusive, individual licensing in the band. Accordingly, Facebook fully supports the WAC Recommendation in WAC/064 for a U.S. proposal to CITEL for No Change – no identification for IMT – in the 66-71 GHz band.

IV. THE COMMISSION SHOULD ADOPT WAC/066-VIEW A FOR AGENDA ITEM 1.16.

Among the WAC's recommendations is a proposal (WAC/066) for WRC-19 Agenda Item 1.16 regarding RLANs in the 5150-5250 MHz band. Facebook urges the Commission to adopt WAC/066-View A for this Agenda Item, which appropriately reaffirms the U.S. position at ITU-R Working Party 5A regarding co-existence of RLANs in this spectrum with other services and aligns ITU Radio Regulations with the Commission's rules governing unlicensed operations in the band.[28]

V. CONCLUSION

The outcome of WRC-19, specifically Agenda Items 1.13, 1.14 and 1.16 could impact the deployment of new and innovative technologies like HAPS, WiGig-based Multi Gigabit Wireless Service, and other RLAN-based technologies. As part of its broader aim to expand connectivity to all, Facebook has worked to develop View A to secure additional spectrum identification for HAPS. However, in an effort to compromise, Facebook notes that the four Views support directionality and agreed pfd limits for the following bands: 21.5 – 22 GHz , 24.25 – 27.5 GHz, 28/31 GHz, 38 – 39.5 GHz and 47 GHz. Accordingly, Facebook recommends

[27] *WAC Public Notice*, Attachment A at 18 WAC/064.

[28] 47 CFR § 15.407.

the Commission champion such a proposal in reconciliation with NTIA of the U.S. position on Agenda Item 1.14. In addition, Facebook supports the WAC's proposal for No Change to the 66-71 GHz band. An IMT identification in this band could disrupt ongoing investment in this band and the adjacent 60 GHz band in new 5G technologies based on unlicensed technologies like WiGig. Lastly, the Commission should adopt WAC-View A for Agenda Item 1.16 to reaffirm the U.S. position regarding the co-existence of RLANs with other services in the 5150-5250 MHz band.

Respectfully submitted,

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